

A search for periodic modulations of the solar neutrino flux in Super-Kamiokande-I

The Super-Kamiokande Collaboration

J. Yoo^w, Y. Ashie^a, S. Fukuda^a, Y. Fukuda^a, K. Ishihara^a, Y. Itow^a, Y. Koshio^a,
A. Minamino^a, M. Miura^a, S. Moriyama^a, M. Nakahata^a, T. Namba^a, R. Nambu^a,
Y. Obayashi^a, N. Sakurai^a, M. Shiozawa^a, Y. Suzuki^a, H. Takeuchi^a, Y. Takeuchi^a,
S. Yamada^a, M. Ishitsuka^b, T. Kajita^b, K. Kaneyuki^b, S. Nakayama^b, A. Okada^b,
T. Ooyabu^b, C. Saji^b, S. Desai^c, M. Earl^c, E. Kearns^c, M.D. Messier^{c,*}, J.L. Stone^c,
L.R. Sulak^c, C.W. Walter^c, M. Goldhaber^d, T. Barszczak^e, D. Casper^e, W. Gajewski^e,
W.R. Kropp^e, S. Mine^e, D.W. Liu^e, M.B. Smy^e, H.W. Sobel^e, M.R. Vagins^e, A. Gago^f,
K.S. Ganezer^f, J. Hill^f, W.E. Keig^f, J.Y. Kim^g, I.T. Lim^g, R.W. Ellsworth^h, S. Tasakaⁱ,
A. Kibayashi^j, J.G. Learned^j, S. Matsuno^j, D. Takemori^j, Y. Hayato^k, A. K. Ichikawa^k,
T. Ishii^k, J. Kameda^k, T. Kobayashi^k, T. Maruyama^{k,†}, K. Nakamura^k, K. Nitta^k,
Y. Oyama^k, M. Sakuda^k, Y. Totsuka^k, M. Yoshida^k, M. Kohama^{l,‡}, T. Iwashita^l,
A.T. Suzuki^l, T. Inagaki^m, I. Kato^m, T. Nakaya^m, K. Nishikawa^m, T.J. Haines^{n,e},
S. Dazeley^o, S. Hatakeyama^o, R. Svoboda^o, E. Blaufuss^p, M.L. Chen^p, J.A. Goodman^p,
G. Guillian^p, G.W. Sullivan^p, D. Turcan^p, K. Scholberg^q, A. Habig^r, M. Ackermann^s,
C.K. Jung^s, T. Kato^s, K. Kobayashi^s, K. Martens^{s,§}, M. Malek^s, C. Mauger^s, C. McGrew^s,
E. Sharkey^s, B. Viren^{s,d}, C. Yanagisawa^s, T. Toshito^t, C. Mitsuda^u, K. Miyano^u,
T. Shibata^u, Y. Kajiyama^v, Y. Nagashima^v, M. Takita^v, H.I. Kim^w, S.B. Kim^w,
H. Okazawa^x, T. Ishizuka^y, Y. Choi^z, H.K. Seo^z, M. Etoh^{aa}, Y. Gando^{aa}, T. Hasegawa^{aa},
K. Inoue^{aa}, J. Shirai^{aa}, A. Suzuki^{aa}, M. Koshihara^{bb}, Y. Hatakeyama^{cc}, Y. Ichikawa^{cc},
M. Koike^{cc}, K. Nishijima^{cc}, H. Ishino^{dd}, M. Morii^{dd}, R. Nishimura^{dd}, Y. Watanabe^{dd},
D. Kielczewska^{ee,e}, H.G. Berns^{ff}, S.C. Boyd^{ff}, A.L. Stachyra^{ff}, R.J. Wilkes^{ff}

^a Kamioka Observatory, Institute for Cosmic Ray Research,

University of Tokyo, Kamioka, Gifu, 506-1205, Japan

^b Research Center for Cosmic Neutrinos, Institute for Cosmic Ray

Research, University of Tokyo, Kashiwa, Chiba 277-8582, Japan

^c Department of Physics, Boston University, Boston, MA 02215, USA

- ^d *Physics Department, Brookhaven National Laboratory, Upton, NY 11973, USA*
- ^e *Department of Physics and Astronomy, University of California, Irvine, Irvine, CA 92697-4575, USA*
- ^g *Department of Physics, California State University, Dominguez Hills, Carson, CA 90747, USA*
- ^f *Department of Physics, Chonnam National University, Kwangju 500-757, Korea*
- ^h *Department of Physics, George Mason University, Fairfax, VA 22030, USA*
- ⁱ *Department of Physics, Gifu University, Gifu, Gifu 501-1193, Japan*
- ^j *Department of Physics and Astronomy, University of Hawaii, Honolulu, HI 96822, USA*
- ^k *Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305-0801, Japan*
- ^l *Department of Physics, Kobe University, Kobe, Hyogo 657-8501, Japan*
- ^m *Department of Physics, Kyoto University, Kyoto 606-8502, Japan*
- ⁿ *Physics Division, P-23, Los Alamos National Laboratory, Los Alamos, NM 87544, USA*
- ^o *Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803, USA*
- ^p *Department of Physics, University of Maryland, College Park, MD 20742, USA*
- ^q *Department of Physics, Massachusetts Institute of Technology, Cambridge, MA 02139, USA*
- ^r *Department of Physics, University of Minnesota, Duluth, MN 55812-2496, USA*
- ^s *Department of Physics and Astronomy, State University of New York, Stony Brook, NY 11794-3800, USA*
- ^t *Department of Physics, Nagoya University, Nagoya, Aichi 464-8602, Japan*
- ^u *Department of Physics, Niigata University, Niigata, Niigata 950-2181, Japan*
- ^v *Department of Physics, Osaka University, Toyonaka, Osaka 560-0043, Japan*
- ^w *Department of Physics, Seoul National University, Seoul 151-742, Korea*
- ^x *International and Cultural Studies, Shizuoka Seika College, Yaizu, Shizuoka, 425-8611, Japan*
- ^y *Department of Systems Engineering, Shizuoka University, Hamamatsu, Shizuoka 432-8561, Japan*
- ^z *Department of Physics, Sungkyunkwan University, Suwon 440-746, Korea*
- ^{aa} *Research Center for Neutrino Science, Tohoku University, Sendai, Miyagi 980-8578, Japan*
- ^{bb} *The University of Tokyo, Tokyo 113-0033, Japan*
- ^{cc} *Department of Physics, Tokai University, Hiratsuka, Kanagawa 259-1292, Japan*
- ^{dd} *Department of Physics, Tokyo Institute for Technology, Meguro, Tokyo 152-8551, Japan*
- ^{ee} *Institute of Experimental Physics, Warsaw University, 00-681 Warsaw, Poland*
- ^{ff} *Department of Physics, University of Washington, Seattle, WA 98195-1560, USA*

Abstract

A search for periodic modulations of the solar neutrino flux was performed using the Super-Kamiokande-I data taken from May 31st, 1996 to July 15th, 2001. The detector's capability of measuring the exact time of events, combined with a relatively high yield of solar neutrino events, allows a search for short-time variations in the observed flux. We employed the Lomb test to look for periodic modulations of the observed solar neutrino flux. The obtained periodogram is consistent with statistical fluctuation and no significant periodicity was found.

I. INTRODUCTION

It is widely accepted that neutrinos have masses based on observation of their oscillation [1] which suggests the presence of physics beyond Standard Model. Neutrino spin orientation would be rotated by the magnetic field in the Sun if neutrinos are Dirac particles with non-vanishing magnetic moments [2]. Such neutrino spin-flavor precession will result in a reduction of the observed solar neutrino fluxes because the right-handed neutrinos are sterile and will be unobserved in a detector. On the other hand, if neutrinos are Majorana particles with a flavor-changing transition magnetic moment, the solar magnetic field could flip ν_e into $\bar{\nu}_\mu$ or $\bar{\nu}_\tau$ and lower the observed solar neutrino fluxes due to the reduced elastic scattering cross section. However, any such possibility must not allow for a flux of solar $\bar{\nu}_e$ above current experimental limits [3]. Based on the above context, any time variation of the solar magnetic fields could introduce periodic modulations in the observed solar neutrino fluxes. There could be semiannual (seasonal) variations of the observed solar neutrino flux because of the changing magnetic field caused by the 7.25 degree inclination of solar axis with respect to the ecliptic plane. A short-time variation might be expected due to the 27-day rotation of the Sun.

Independent of magnetic effects, the ^8B neutrino flux is sensitive to the core temperature of the Sun, approximately proportional to T_c^{25} [4]. If the solar core temperature changes in time, this might induce a time variation in the observed solar neutrino flux.

There has been several attempts to search for possible periodic variations in measured solar neutrino fluxes. The Homestake experiment appeared to exhibit 11-year periodic modulations on the data which anticorrelated with solar activity [5]. However, Kamiokande and other experiments have not provided any evidence for a time variation of the neutrino flux outside of statistical fluctuations [6]. Observation of a periodic modulation in the solar neutrino flux would provide a significant addition to our understanding of solar dynamics and the magnetic properties of neutrinos, and possibly require modification of the Standard Solar Model.

Super-Kamiokande (SK) is a 50 kton water Cherenkov detector located in Kamioka, Japan. Solar neutrino data were collected at SK from May 31st, 1996 to July 15th, 2001 yielding a total detector live time of 1,496 days. This data taking period is known as SK-I. A detailed description of SK can be found elsewhere [7][8]. The solar neutrino signal is

extracted from the data using the $\cos\theta_{sun}$ distribution, the angular deviation between the Sun and the reconstructed direction of events with total energies ranging between 5 and 20 MeV [9]. From the strong forward peak due to elastic scattering of ^8B solar neutrinos on electrons, $22,400 \pm 200(\text{stat.})$ solar neutrino interactions were observed in 22.5 ktons of fiducial volume. The relatively high yield of real-time events in SK, 15 events per day, allows a search for short-time periodic modulations in the observed neutrino fluxes.

II. SK 10-DAY LONG SAMPLED SOLAR NEUTRINO DATA

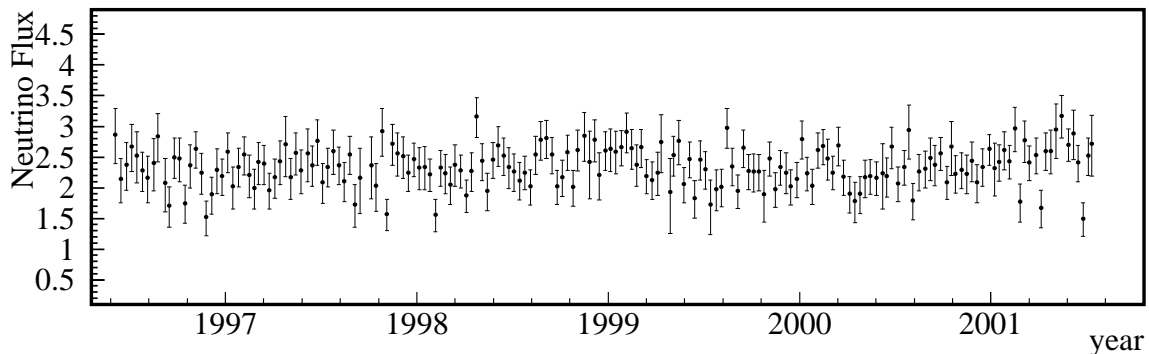


FIG. 1: Measured solar neutrino fluxes of 10-day long samples. The horizontal axis is time (year) from the beginning of the data-taking and the vertical axis is the measured neutrino flux in units of $10^6 \text{ cm}^{-2} \text{ s}^{-1}$. The $1/R^2$ correction is included in the shown neutrino fluxes.

The solar neutrino data, acquired over 1,871 elapsed days from the beginning of data-taking, are divided into roughly 10-day long samples as listed in Table I. The time period of each 10-day sample is chosen from consecutive 10-day periods. Note that the start time of a 10-day sample is determined by the beginning of data-taking on the first day of the sample, and the stop time by the finish of data-taking on the last day. There are on and off periods of data-taking in the 10-day interval and thus the timing of each sample is calculated as a mean of the start and end times and corrected by SK livetime. Hence the mean time is not necessarily an exact division of the time interval for each 10-day sample. Figure 1 shows the measured solar neutrino fluxes of the 10-day samples. All given uncertainties are statistical and estimated by asymmetric Gaussian approximation of the unbinned maximum likelihood fit to the $\cos\theta_{sun}$ distributions. The measured solar neutrino fluxes are corrected for the $1/R^2$ (squared average distance in units of A.U.) variation caused by the eccentricity of the Earth's orbit around the Sun.

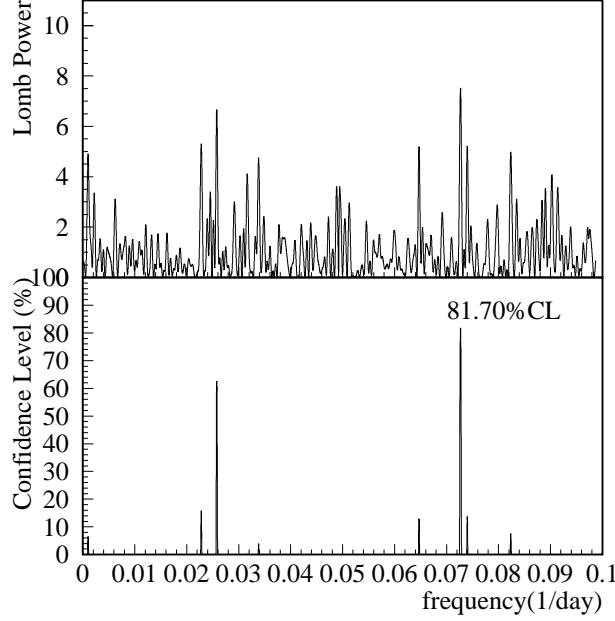


FIG. 2: A Lomb periodogram of the SK 10-day long solar neutrino data samples. The Lomb power and its corresponding confidence level are given as a function of frequency.

III. SEARCH FOR PERIODICITY

The Lomb periodogram method [10], a spectral analysis for unevenly sampled data, is applied to search for possible periodicities in the measured 10-day long fluxes. The method finds periodicities based on maximum deviation of data relative to a constant in time. The normalized Lomb power is given by

$$P_N(w) \equiv \frac{1}{2\sigma^2} \left\{ \frac{[\sum_j (\phi_j - \bar{\phi}) \cos \omega(t_j - \tau)]^2}{\sum_j \cos^2 \omega(t_j - \tau)} + \frac{[\sum_j (\phi_j - \bar{\phi}) \sin \omega(t_j - \tau)]^2}{\sum_j \sin^2 \omega(t_j - \tau)} \right\} \quad (1)$$

where ϕ_j is the measured flux in the j -th bin, t_j is the mean time with livetime correction in the j -th bin, ω is the frequency being tested, $\bar{\phi} \equiv \sum_{i=1}^N \phi_i / N$, $\sigma^2 \equiv \sum_{i=1}^N (\phi_i - \bar{\phi})^2 / (N - 1)$, and offset time τ is defined by $\tan(2\omega\tau) = \sum_j \sin 2\omega t_j / \sum_j \cos 2\omega t_j$. Under the null hypothesis, it is expected that the data are Gaussian random values and the Lomb normalized power ($P_N(w)$) is distributed exponentially with unit mean. Here we define the Confidence Level (C.L.) of the given Lomb Power P_N as $(1 - e^{-P_N})^M \times 100\%$, the probability of no frequencies being scanned giving values larger than P_N due to random fluctuation. The number of

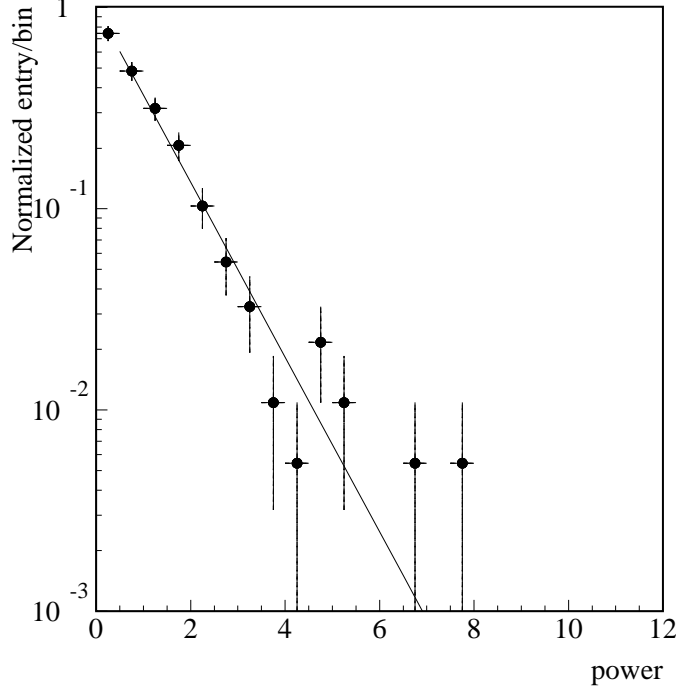


FIG. 3: A power distribution of the Lomb periodogram of the SK 10-day long solar neutrino data samples. The solid line shows an expected distribution of no particular periodicity (e^{-P_N}).

independent frequencies scanned, M , is given by approximately twice of the number of data points, i.e. $M = 2 \times 184 = 368$. The frequency ranges from 0.00020 day^{-1} to 0.09870 day^{-1} and 18,363 frequencies are scanned in this range. The resulting periodogram is shown in Figure 2 together with its confidence level diagram. The maximum power appears at frequency $f=0.0726 \text{ day}^{-1}$ (or time period $T=13.76 \text{ days}$) with Lomb power 7.51 corresponding to 81.70% C.L.

Figure 3 shows a normal distribution of the powers in the Lomb periodogram for SK solar neutrino data. Here the powers are calculated for 368 independent frequencies from 0 day^{-1} to 0.1 day^{-1} .

As a consistency check for the confidence level, 10,000 MC experiments are generated based on the observed timing information and the measured solar neutrino fluxes of the 10-day long data samples. The measured solar neutrino flux values are simulated according to a random Gaussian fluctuation. For making these null modulation samples the average measured flux ($2.33 \times 10^6 \text{ cm}^{-2} \text{ s}^{-1}$) is taken as a Gaussian mean, and the standard deviation of the the measured flux ($0.32 \times 10^6 \text{ cm}^{-2} \text{ s}^{-1}$) is taken as a Gaussian error [11]. The

Lomb method is applied to each MC experiment to obtain a periodogram. The Lomb power distribution has an exponential distribution as expected for the null modulation. The maximum power of each periodogram is selected. Figure 4 shows a distribution of maximum powers for the MC experiment sets. Out of 10,000 simulated experiments, 19.58% have maximum powers larger than 7.51. This demonstrates that the confidence level for the $T=13.76$ day period of SK data is consistent with that of no modulation.

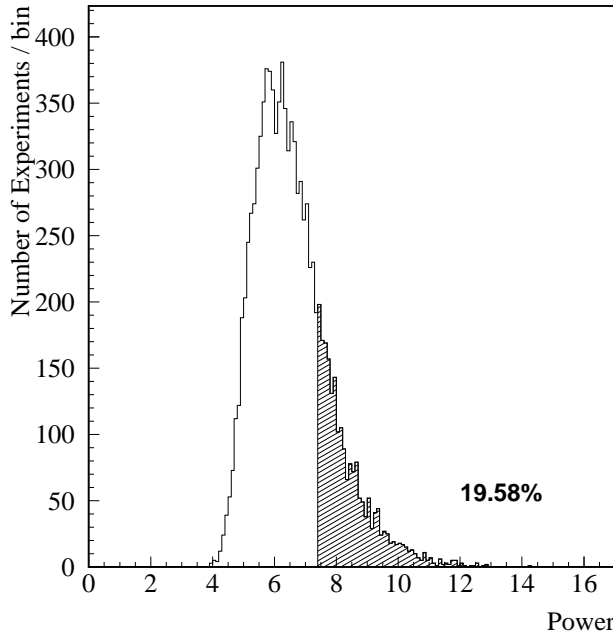


FIG. 4: A distribution of maximum powers for 10,000 MC experiment sets. The horizontal axis is Lomb power, and the vertical axis is the number of MC experiment sets.

In order to extend the investigation to shorter time modulation more precisely, we repeat the search for periodicities in a time interval of 5 days (see Figure 5 and Table II) using the Lomb method. Figure 6 shows a periodogram for the 5-day long samples. For the 5-day long sample, the frequency ranges from 0.00020 day^{-1} to 0.19187 day^{-1} and 35,763 frequencies are scanned in this range. The number of independent frequencies scanned is $M=716$. The maximum Lomb power of 7.35 (63.09% C.L.), consistent with no modulation, is found at frequency $f=0.1197 \text{ day}^{-1}$ ($T=8.35$ days). In this case, the Lomb power for the period of 13.76 days ($f=0.0726 \text{ day}^{-1}$) is 1.35 and is no longer the maximum. This provides additional confirmation that the 13.76 day period in 10-day long sample is a statistical artifact.

Our results are in clear disagreement with the previous analyses of SK data by Milsztajn

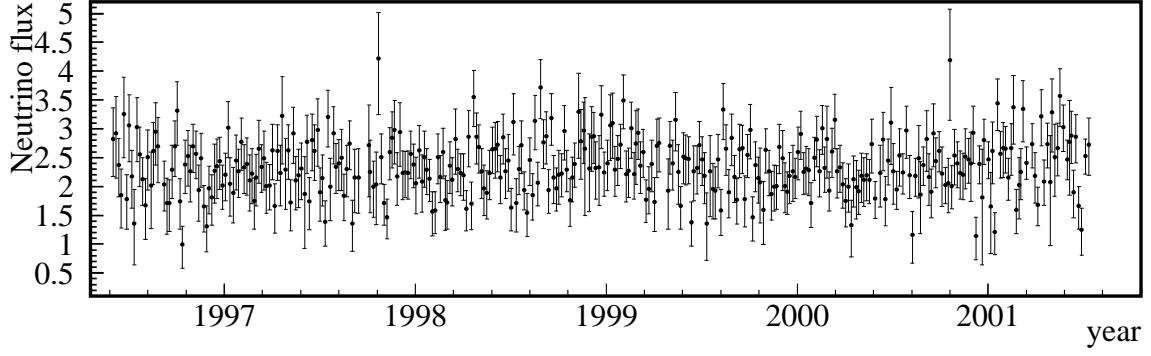


FIG. 5: Measured solar neutrino fluxes of 5-day long samples. The horizontal axis is time (year) from the beginning of the data-taking and the vertical axis is the measured neutrino flux in units of $10^6 \text{ cm}^{-2} \text{ s}^{-1}$. The $1/R^2$ correction is included in the shown neutrino fluxes.

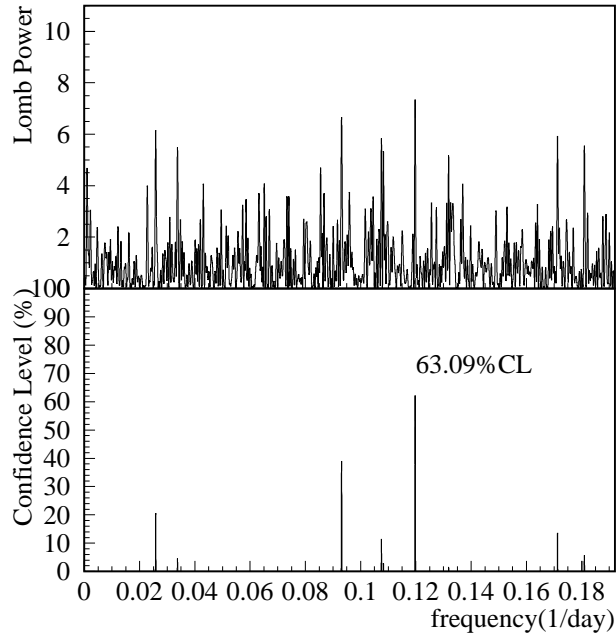


FIG. 6: A periodogram of the SK 5-day long solar neutrino data samples. The Lomb power and its corresponding confidence level is given as a function of frequency. Note that the searched frequency range is extended up to 0.19 day^{-1} .

[12] and Caldwell and Sturrock [13], in which they claim to find a significant periodic variation of our data with 13.76 days' periodicity. The main difference between their analyses and ours is that they have used uniform 10-day binned data in which the time of each data point is exactly centered between the start and stop times of each 10 day period [12] or integrating expected flux from the start time to the end time of each 10-day bin without taking into account breaks of runs [13]. On the other hand, we use the correct time for the data contained in each 10 day bin based on the livetime weighted mean time as described

above. We investigate 5-day binned data as well to find no significant periodic variation.

IV. SENSITIVITY OF FINDING A PERIODICITY VS. MODULATION AMPLITUDE

We have studied the sensitivity of the SK-I solar neutrino data to find if a true periodicity indeed exists. The sensitivity will depend on the amplitude of modulation because of experimental uncertainties in the SK-I data. One thousand MC experiment sets are generated to simulate the SK 10-day long solar neutrino fluxes for a given period and modulation amplitude. While introducing modulations of periods from 5 days to 500 days and varying the magnitude of modulation from 1% to 90% of the averaged total flux ($2.33 \times 10^6 \text{ cm}^{-2} \text{ s}^{-1}$), we repeatedly generate 1,000 MC experiments at each amplitude. An individual MC experiment set is generated in the following way. The modulated solar neutrino flux is generated for entire SK-I data-taking period, and the mean flux is calculated for the individual 10-day long time periods. The MC neutrino flux of every 10-day long sample is then generated by a random Gaussian fluctuation from the mean flux value. The Gaussian error is taken as the error in the measured neutrino flux of each 10-day sample as listed in Table I. The Lomb periodogram method is applied to every MC experiment. A reconstructed period is determined by the primary modulation having the maximum Lomb power larger than 9.82 (98% C.L.). We calculate the probability of correctly finding the generated period at each modulation amplitude. The observed period is assigned to a correct one if its corresponding frequency is consistent with $1/(\text{input period}) \pm 0.1/368/2$ for the 10-day long sample, to consider the error on the reconstructed period. The probability of reconstructing the input periodicity becomes significantly reduced as the modulation amplitude becomes less than the magnitude of the measured neutrino flux error. The MC study is repeated for 5-day long samples. In the 5-day long sample case, the selection criterion of correct frequency is $1/(\text{input period}) \pm 0.2/716/2$. Figure 7 shows 95% sensitive contours of modulation amplitude vs. period for 10-day and 5-day long samples. The sensitivity is defined as a probability of finding the correct periodicity as a primary modulation.

According to Figure 7, the sensitivity of finding the correct period varies rapidly near the sampling time periods of $5 \sim 20$ days. In general, shorter modulation periods have worse sensitivity for a given sampling frequency, while the 5-day long sampled data have better

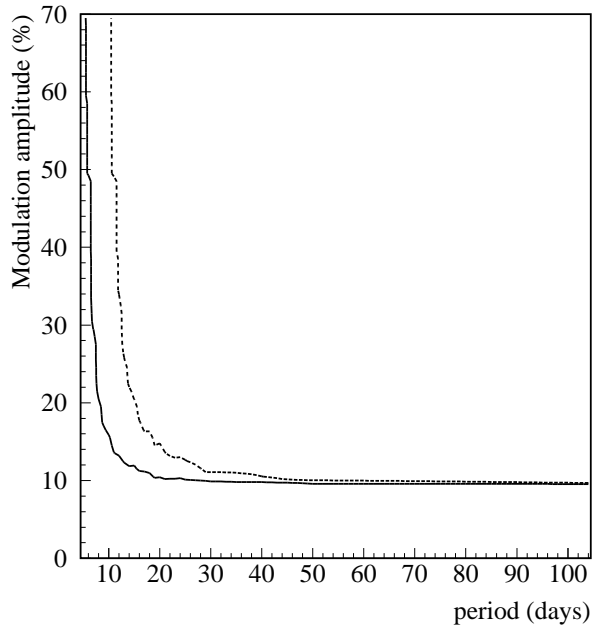


FIG. 7: A 95% contour plot of the sensitivity to find correct periodicity in 10-day (dotted) and 5-day (solid) long sampled SK solar neutrino data. The horizontal axis is simulated period in days. The vertical axis is modulation amplitude in percentile. Each contour represents 95% probability of finding the correct periodicity.

sensitivity than those of the 10-day data, especially for shorter modulation periods. Based on the MC study, the Lomb method is expected to find the true periodicity of the SK-I data, if any, with an efficiency of 95% at a modulation amplitude of 10% of the averaged flux and a period of longer than 40 days (20 days) in case of the 10-day (5-day) long sample.

V. SUMMARY

We have presented the measured solar neutrino fluxes of 10-day long samples and of 5-day long samples using all 1,496 days of SK-I data. No significant periodicity was found in the SK-I solar neutrino data when a search was made to look for periodic modulations of the observed fluxes using the Lomb method. Based on a MC study, we have obtained the probability of finding a true periodicity in the SK-I data as a function of the modulation magnitude. The Lomb method should have found a periodic modulation in the SK-I solar neutrino data of 10-day (5-day) long samples if the modulation period were longer than 40 days (20 days) and its magnitude was larger than 10% of the average measured neutrino

fluxes. Based on the observation of no significant periodicity, SK-I data exclude modulations greater than 10% of the ^8B neutrino flux arising as a result of more than 0.4% changes in the solar core temperature, allowing a new measure of the solar core's stability.

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- [*] Present address: Harvard University, Cambridge, MA 02138, USA
 - [†] Present address: Enrico Fermi Institute, University of Chicago, Chicago, IL 6063 7, USA
 - [‡] Present address: The Institute of Physical and Chemical Research (RIKEN), Wako, Saitama 351-0198, Japan
 - [§] Present address: Department of Physics, University of Utah, Salt Lake City, UT 8 4112, USA
 - [1] Y.Fukuda et al., Phys. Rev. Lett. **81**, 1158 (1998); S.Fukuda et al., Phys. Lett. **B539**, 179 (2002); Q.R. Ahmad et al., Phys. Rev. Lett. **89**, 011302 (2002).
 - [2] A.Cisneros, Astrophysic. Space Sci. **10**, 87 (1971); L.B.Okun, Sov. J. Nucl. Phys. **44**, 546 (1986); M.B.Voloshin et al., Sov. J. Nucl. Phys. **44**, 440 (1986); M.B.Voloshin et al., Sov. Phys.-JETP **64** 446 (1986); E.Kh.Akhmedov, Proc. 4th International Solar Neutrino Conference, Heidelberg, Germany, April 9-11, (1997); J.Pulido and E.Kh.Akhmedov, Astro. Phys. **13**, 227 (2000).
 - [3] Y.Gando et al., Phys. Rev. Lett. **90**, 171302 (2003).
 - [4] J.N.Bahcall, Phys.Rev. **C65**, 015802 (2002).
 - [5] R.Davis, Prog. Part. Nucl. Phys. **32**, 13 (1994).
 - [6] Y.Fukuda et al., Phys. Rev. Lett. **77**, 1683 (1996)
 - [7] Y.Fukuda et al., Phys. Rev. Lett. **81**, 1158 (1998).
 - [8] S.Fukuda et al., Nucl. Instrum. Meth. **A501**, 418 (2003).

- [9] S.Fukuda et al., Phys. Rev. Lett. **86**, 5651 (2001).
- [10] W.H.Press et al., *Numerical Recipes in C*, Cambridge University Press, 2nd edition, chapter 13.8 (1999).
- [11] J.H.Horne and S.L.Baliunas, Astrophys. J. **302**, 757 (1986).
- [12] A.Milsztajn, hep-ph/0301252.
- [13] D.O.Caldwell and P.A.Sturrock, hep-ph/0305303; P.A.Sturrock, Astrophys. J. (in press).

TABLE I: SK solar neutrino data divided into 10-day long samples. t_w is mean time with livetime correction. t_s is start time. t_e is end time. R^2 is square of the distance between the Sun and the Earth, in unit of AU². ϕ_ν is measured ⁸B neutrino flux without correction of R^2

No.	t_w	t_s	t_e	R^2	ϕ_ν	No.	t_w	t_s	t_e	R^2	ϕ_ν
1	1996/06/04 10:53	05/31 04:31	06/10 01:19	1.029	2.79+0.47-0.41	61	1998/02/15 07:17	02/10 07:02	02/20 08:10	0.976	2.39+0.32-0.29
2	1996/06/14 17:56	06/10 01:27	06/20 03:41	1.032	2.07+0.37-0.33	62	1998/02/24 20:51	02/20 09:45	02/28 17:32	0.980	2.29+0.35-0.31
3	1996/06/25 13:41	06/20 03:45	06/30 14:11	1.033	2.30+0.41-0.36	63	1998/03/05 13:24	02/28 17:35	03/10 06:37	0.984	2.08+0.33-0.29
4	1996/07/05 11:28	06/30 14:16	07/10 03:18	1.034	2.58+0.40-0.35	64	1998/03/14 21:02	03/10 06:41	03/20 00:39	0.989	2.41+0.36-0.32
5	1996/07/15 14:18	07/10 03:30	07/20 01:19	1.033	2.44+0.43-0.38	65	1998/03/25 20:16	03/20 00:42	03/31 15:49	0.995	2.29+0.28-0.25
6	1996/07/25 18:06	07/20 01:28	07/31 08:19	1.032	2.21+0.33-0.29	66	1998/04/05 20:52	03/31 15:51	04/10 22:50	1.001	1.88+0.28-0.25
7	1996/08/05 10:46	07/31 16:06	08/10 00:35	1.029	2.10+0.39-0.34	67	1998/04/15 14:59	04/10 22:52	04/20 10:41	1.007	2.25+0.33-0.30
8	1996/08/16 12:09	08/10 20:31	08/20 06:16	1.025	2.34+0.44-0.39	68	1998/04/25 09:40	04/20 11:35	04/30 10:27	1.012	3.12+0.34-0.31
9	1996/08/24 14:31	08/20 06:33	08/31 11:47	1.022	2.78+0.41-0.36	69	1998/05/05 07:58	04/30 10:48	05/10 06:12	1.017	2.40+0.31-0.28
10	1996/09/07 21:16	08/31 11:51	09/10 11:28	1.015	2.05+0.46-0.39	70	1998/05/15 12:26	05/10 06:14	05/20 12:03	1.022	1.91+0.31-0.28
11	1996/09/15 11:16	09/10 11:53	09/20 00:38	1.011	1.69+0.35-0.30	71	1998/05/26 04:27	05/20 12:06	05/31 16:14	1.026	2.40+0.30-0.27
12	1996/09/25 10:01	09/20 05:00	09/30 11:13	1.006	2.49+0.35-0.31	72	1998/06/05 12:29	05/31 16:15	06/10 07:54	1.029	2.61+0.33-0.30
13	1996/10/05 04:43	09/30 11:14	10/10 10:31	1.000	2.48+0.38-0.33	73	1998/06/15 09:00	06/10 07:57	06/20 11:44	1.032	2.44+0.31-0.28
14	1996/10/15 11:21	10/10 10:42	10/20 16:22	0.994	1.76+0.33-0.29	74	1998/06/25 04:52	06/20 11:48	06/30 00:00	1.033	2.27+0.34-0.30
15	1996/10/25 05:19	10/20 17:31	10/30 03:19	0.989	2.40+0.37-0.33	75	1998/07/05 04:02	06/30 00:02	07/10 23:08	1.034	2.19+0.31-0.28
16	1996/11/05 01:54	10/30 03:47	11/10 22:14	0.983	2.68+0.32-0.28	76	1998/07/15 20:04	07/10 23:13	07/20 13:25	1.033	2.05+0.31-0.28
17	1996/11/15 19:54	11/10 22:17	11/20 11:37	0.978	2.30+0.37-0.32	77	1998/07/26 03:52	07/20 13:26	07/31 19:08	1.032	2.18+0.27-0.25
18	1996/11/25 08:59	11/20 12:34	11/30 01:02	0.974	1.56+0.31-0.27	78	1998/08/05 15:29	07/31 19:13	08/10 13:48	1.029	1.96+0.29-0.26
19	1996/12/05 08:16	11/30 01:07	12/10 07:00	0.971	1.95+0.33-0.29	79	1998/08/15 16:56	08/10 13:51	08/20 13:30	1.026	2.48+0.31-0.29
20	1996/12/15 20:58	12/10 07:04	12/20 16:53	0.969	2.36+0.40-0.35	80	1998/08/25 11:47	08/20 13:32	08/31 08:08	1.022	2.72+0.32-0.29
21	1996/12/25 22:35	12/20 17:14	12/31 04:42	0.967	2.26+0.32-0.29	81	1998/09/05 10:26	08/31 08:29	09/10 15:07	1.017	2.76+0.32-0.29
22	1997/01/05 15:32	12/31 04:46	01/10 14:11	0.967	2.68+0.35-0.31	82	1998/09/15 17:10	09/10 15:17	09/20 15:19	1.011	2.51+0.31-0.28
23	1997/01/15 12:41	01/10 14:15	01/20 09:04	0.968	2.09+0.38-0.33	83	1998/09/25 10:04	09/20 15:20	09/30 05:05	1.006	2.01+0.29-0.26
24	1997/01/26 03:51	01/20 16:50	01/31 08:09	0.969	2.41+0.34-0.31	84	1998/10/05 16:02	09/30 05:10	10/10 15:33	1.000	2.17+0.31-0.28
25	1997/02/05 12:25	01/31 08:58	02/10 16:01	0.972	2.61+0.34-0.30	85	1998/10/15 18:00	10/10 15:35	10/20 20:36	0.994	2.60+0.30-0.28
26	1997/02/15 09:40	02/10 16:04	02/20 06:56	0.976	2.26+0.38-0.33	86	1998/10/26 02:24	10/20 20:39	10/30 07:51	0.989	2.03+0.31-0.27
27	1997/02/24 17:56	02/20 08:22	02/28 22:36	0.980	2.04+0.36-0.31	87	1998/11/03 23:30	10/30 07:54	11/10 15:13	0.984	2.66+0.36-0.33
28	1997/03/05 07:33	02/28 22:39	03/10 09:39	0.984	2.46+0.38-0.33	88	1998/11/16 11:43	11/10 18:00	11/20 13:50	0.978	2.91+0.43-0.39
29	1997/03/15 04:28	03/10 09:46	03/20 02:16	0.989	2.42+0.34-0.30	89	1998/11/26 23:12	11/20 13:52	11/30 08:38	0.974	2.48+0.62-0.51
30	1997/03/25 16:07	03/20 02:26	03/31 09:21	0.995	1.97+0.31-0.28	90	1998/12/06 12:54	11/30 09:28	12/10 12:26	0.971	2.86+0.37-0.34
31	1997/04/05 10:10	03/31 21:11	04/10 03:03	1.001	2.17+0.34-0.30	91	1998/12/14 19:58	12/10 12:31	12/20 05:27	0.969	2.28+0.42-0.37
32	1997/04/15 06:10	04/10 03:46	04/20 04:41	1.006	2.42+0.38-0.33	92	1998/12/26 10:07	12/20 05:31	12/31 13:01	0.967	2.70+0.34-0.31
33	1997/04/25 08:16	04/20 07:17	04/30 00:22	1.012	2.68+0.52-0.44	93	1999/01/05 10:19	12/31 13:58	01/10 20:01	0.967	2.72+0.38-0.34
34	1997/05/05 07:41	04/30 00:31	05/10 03:37	1.017	2.13+0.35-0.30	94	1999/01/15 19:32	01/10 20:03	01/20 00:03	0.968	2.68+0.37-0.34
35	1997/05/15 01:11	05/10 04:19	05/20 00:38	1.022	2.51+0.35-0.31	95	1999/01/26 06:10	01/20 00:45	01/31 18:46	0.969	2.74+0.31-0.28
36	1997/05/25 08:20	05/20 00:41	05/31 05:47	1.026	2.22+0.37-0.33	96	1999/02/05 07:05	01/31 18:47	02/10 09:15	0.972	2.99+0.35-0.32
37	1997/06/06 17:41	05/31 06:10	06/10 02:33	1.030	2.49+0.45-0.39	97	1999/02/15 06:16	02/10 16:30	02/20 00:00	0.975	2.71+0.35-0.32
38	1997/06/15 05:51	06/10 03:33	06/20 12:17	1.032	2.30+0.34-0.30	98	1999/02/24 03:17	02/20 00:03	02/28 02:13	0.979	2.43+0.37-0.33
39	1997/06/25 02:15	06/20 12:22	06/30 02:28	1.033	2.67+0.38-0.34	99	1999/03/04 17:06	02/28 02:16	03/10 00:33	0.983	2.71+0.34-0.30
40	1997/07/05 12:15	06/30 02:31	07/10 07:24	1.034	2.02+0.33-0.29	100	1999/03/15 04:46	03/10 01:03	03/20 08:31	0.989	2.21+0.29-0.27
41	1997/07/15 07:04	07/10 07:29	07/20 12:47	1.033	2.27+0.32-0.29	101	1999/03/25 23:27	03/20 08:34	03/31 16:11	0.995	2.14+0.32-0.29
42	1997/07/25 19:34	07/20 12:55	07/31 00:40	1.032	2.52+0.37-0.33	102	1999/04/05 15:50	04/01 01:42	04/10 00:02	1.001	2.25+0.37-0.33
43	1997/08/05 04:59	07/31 01:04	08/10 05:33	1.029	2.30+0.31-0.28	103	1999/04/12 05:55	04/10 00:22	04/20 00:43	1.004	2.74+0.50-0.44
44	1997/08/15 16:59	08/10 05:38	08/20 14:35	1.026	2.06+0.33-0.29	104	1999/04/29 15:01	04/20 00:49	04/30 19:59	1.014	1.90+0.66-0.54
45	1997/08/26 02:23	08/20 14:45	08/31 13:09	1.021	2.49+0.31-0.29	105	1999/05/05 10:49	04/30 20:00	05/10 04:14	1.017	2.49+0.33-0.30
46	1997/09/04 16:06	08/31 13:11	09/10 04:48	1.017	1.70+0.36-0.31	106	1999/05/15 18:36	05/10 04:15	05/20 16:02	1.022	2.70+0.37-0.33
47	1997/09/14 11:21	09/10 04:50	09/20 01:01	1.012	2.13+0.57-0.48	107	1999/05/25 16:49	05/20 16:06	05/31 04:51	1.026	2.01+0.29-0.26
48	1997/10/05 21:24	09/30 00:42	10/10 18:48	1.000	2.37+0.54-0.46	108	1999/06/05 12:48	05/31 04:53	06/10 18:57	1.029	2.40+0.30-0.27
49	1997/10/15 10:10	10/10 18:50	10/20 16:16	0.994	2.04+0.41-0.36	109	1999/06/15 02:11	06/10 18:59	06/20 02:39	1.032	1.77+0.31-0.28
50	1997/10/26 19:13	10/20 18:13	10/30 14:40	0.988	2.96+0.42-0.37	110	1999/06/25 11:15	06/20 02:43	06/30 05:21	1.033	2.38+0.32-0.29
51	1997/11/05 02:59	10/30 14:49	11/10 18:55	0.983	1.60+0.27-0.24	111	1999/07/05 07:36	06/30 05:39	07/10 08:12	1.034	2.22+0.31-0.28
52	1997/11/15 15:50	11/10 00:53	11/20 19:59	0.978	2.78+0.36-0.32	112	1999/07/14 23:27	07/10 08:18	07/20 00:09	1.033	1.67+0.47-0.39
53	1997/11/25 00:37	11/20 20:02	11/30 02:45	0.975	2.63+0.38-0.34	113	1999/07/26 11:28	07/20 00:11	07/31 02:30	1.032	1.92+0.34-0.30
54	1997/12/05 15:43	11/30 04:04	12/10 11:35	0.971	2.58+0.37-0.33	114	1999/08/05 11:20	07/31 02:39	08/10 15:46	1.029	1.95+0.31-0.28
55	1997/12/15 08:05	12/10 11:38	12/20 13:00	0.969	2.32+0.32-0.29	115	1999/08/15 16:24	08/10 15:48	08/20 17:18	1.026	2.90+0.33-0.30
56	1997/12/26 04:25	12/20 13:14	12/31 21:10	0.967	2.55+0.30-0.27	116	1999/08/25 22:26	08/20 17:19	08/31 11:54	1.022	2.30+0.31-0.28
57	1998/01/05 20:18	12/31 21:12	01/10 23:32	0.967	2.41+0.37-0.33	117	1999/09/05 11:36	08/31 11:57	09/10 13:27	1.017	1.92+0.29-0.26
58	1998/01/16 01:49	01/10 23:34	01/20 08:45	0.968	2.42+0.38-0.34	118	1999/09/15 19:28	09/10 13:28	09/20 21:40	1.011	2.62+0.32-0.29
59	1998/01/25 21:40	01/20 09:11	01/31 11:16	0.969	2.29+0.29-0.26	119	1999/09/25 21:49	09/20 21:41	09/30 20:40	1.006	2.26+0.30-0.27
60	1998/02/05 10:24	01/31 11:18	02/10 06:59	0.972	1.61+0.29-0.26	120	1999/10/05 06:58	09/30 20:42	10/10 12:04	1.000	2.26+0.33-0.29

No.	t_w	t_s	t_e	R^2	ϕ_ν
121	1999/10/15 12:46	10/10 12:09	10/21 00:12	0.995	2.27+0.31-0.28
122	1999/10/25 11:57	10/21 00:14	10/30 10:26	0.989	1.91+0.45-0.39
123	1999/11/05 00:08	10/30 10:28	11/10 14:56	0.984	2.52+0.29-0.27
124	1999/11/15 17:32	11/10 14:57	11/20 09:14	0.979	2.02+0.31-0.28
125	1999/11/25 06:07	11/20 09:15	11/30 12:44	0.975	2.40+0.31-0.28
126	1999/12/06 12:36	11/30 18:24	12/10 03:53	0.971	2.32+0.36-0.33
127	1999/12/15 04:00	12/10 08:07	12/20 09:21	0.969	2.08+0.31-0.28
128	1999/12/27 02:01	12/20 10:20	12/31 20:06	0.967	2.21+0.31-0.28
129	2000/01/05 10:22	12/31 20:07	01/10 01:56	0.967	2.89+0.33-0.30
130	2000/01/15 05:01	01/10 01:58	01/20 14:16	0.967	2.32+0.30-0.27
131	2000/01/25 07:50	01/20 14:33	01/31 01:28	0.969	2.09+0.31-0.28
132	2000/02/05 06:15	01/31 01:39	02/10 08:41	0.972	2.70+0.31-0.28
133	2000/02/15 10:41	02/10 08:42	02/20 10:48	0.975	2.75+0.31-0.28
134	2000/02/24 05:01	02/20 10:49	02/28 01:22	0.979	2.53+0.36-0.32
135	2000/03/04 19:09	02/28 01:23	03/10 08:51	0.984	2.29+0.28-0.26
136	2000/03/15 07:08	03/10 08:55	03/20 02:14	0.989	2.72+0.33-0.30
137	2000/03/25 17:49	03/20 02:23	03/31 09:33	0.995	2.19+0.30-0.27
138	2000/04/05 21:39	03/31 20:08	04/10 14:37	1.001	1.90+0.31-0.28
139	2000/04/16 05:33	04/10 15:24	04/20 08:57	1.007	1.77+0.35-0.31
140	2000/04/26 03:26	04/20 14:20	04/30 17:04	1.013	1.88+0.32-0.28
141	2000/05/05 15:10	04/30 17:20	05/10 08:26	1.017	2.13+0.32-0.28
142	2000/05/15 17:26	05/10 08:28	05/20 16:32	1.022	2.14+0.29-0.26
143	2000/05/27 02:16	05/20 16:33	06/02 15:13	1.027	2.10+0.27-0.25
144	2000/06/08 00:31	06/02 15:14	06/11 13:08	1.030	2.17+0.57-0.47
145	2000/06/16 00:50	06/11 13:09	06/20 08:52	1.032	2.12+0.33-0.29
146	2000/06/25 05:19	06/20 08:56	06/30 17:36	1.033	2.58+0.35-0.31
147	2000/07/07 14:22	07/01 17:50	07/13 14:47	1.034	2.00+0.29-0.26
148	2000/07/19 08:53	07/13 14:49	07/25 08:09	1.033	2.27+0.29-0.26
149	2000/07/28 11:07	07/25 12:46	07/31 01:08	1.031	2.85+0.46-0.40
150	2000/08/05 05:32	07/31 01:10	08/10 10:40	1.029	1.74+0.30-0.27
151	2000/08/16 10:22	08/10 10:47	08/22 08:03	1.025	2.20+0.30-0.27
152	2000/08/28 15:52	08/22 08:11	09/03 03:28	1.020	2.26+0.30-0.28
153	2000/09/07 05:54	09/03 03:30	09/11 09:38	1.016	2.45+0.36-0.32
154	2000/09/15 21:46	09/11 15:22	09/20 04:05	1.011	2.35+0.35-0.31
155	2000/09/26 20:26	09/20 04:09	10/03 03:01	1.005	2.55+0.28-0.26
156	2000/10/09 06:41	10/03 03:02	10/15 02:45	0.998	2.09+0.28-0.26
157	2000/10/17 12:17	10/15 02:49	10/20 01:19	0.993	2.69+0.47-0.41
158	2000/10/25 13:44	10/20 01:22	10/31 07:33	0.989	2.25+0.32-0.29
159	2000/11/05 21:59	10/31 07:34	11/11 06:38	0.983	2.33+0.31-0.28
160	2000/11/15 20:05	11/11 07:11	11/21 15:44	0.978	2.28+0.34-0.31
161	2000/11/25 20:58	11/21 17:26	11/30 08:10	0.974	2.51+0.35-0.32
162	2000/12/05 16:39	11/30 08:26	12/10 02:44	0.971	2.15+0.34-0.30
163	2000/12/15 22:02	12/10 02:46	12/20 23:17	0.969	2.42+0.33-0.30
164	2000/12/28 23:32	12/20 23:32	01/05 09:49	0.967	2.72+0.27-0.25
165	2001/01/08 14:58	01/05 09:52	01/11 16:44	0.967	2.40+0.47-0.42
166	2001/01/16 17:27	01/11 16:46	01/22 03:19	0.968	2.50+0.32-0.29
167	2001/01/26 16:08	01/22 03:21	01/31 03:25	0.970	2.70+0.34-0.30
168	2001/02/05 15:56	01/31 03:28	02/11 06:17	0.972	2.50+0.30-0.27
169	2001/02/15 17:47	02/11 06:19	02/20 01:26	0.976	3.04+0.39-0.35
170	2001/02/25 12:14	02/20 01:35	03/02 08:36	0.980	1.81+0.34-0.30
171	2001/03/06 06:04	03/02 08:38	03/10 04:39	0.984	2.81+0.37-0.33
172	2001/03/15 08:39	03/10 04:44	03/23 09:21	0.989	2.44+0.29-0.27
173	2001/03/28 15:55	03/23 09:24	04/03 00:02	0.996	2.54+0.30-0.28
174	2001/04/06 18:16	04/03 00:05	04/10 14:47	1.002	1.67+0.32-0.29
175	2001/04/15 19:22	04/10 14:50	04/20 22:30	1.007	2.58+0.32-0.29
176	2001/04/25 04:17	04/20 22:33	04/30 09:36	1.012	2.57+0.37-0.34
177	2001/05/05 15:58	04/30 22:18	05/10 16:53	1.017	2.90+0.46-0.41
178	2001/05/16 06:07	05/10 16:55	05/21 01:50	1.022	3.10+0.35-0.32
179	2001/05/28 20:40	05/21 01:52	06/04 20:38	1.027	2.63+0.26-0.25
180	2001/06/07 23:38	06/04 20:41	06/11 02:23	1.030	2.80+0.41-0.37
181	2001/06/15 23:08	06/11 02:26	06/20 16:35	1.032	2.34+0.30-0.27
182	2001/06/25 17:45	06/20 16:38	06/30 20:07	1.033	1.45+0.28-0.25
183	2001/07/05 14:02	06/30 20:08	07/10 11:38	1.034	2.45+0.31-0.28
184	2001/07/12 16:22	07/10 12:08	07/15 08:34	1.033	2.63+0.51-0.45

TABLE II: SK solar neutrino data divided into 5-day long samples. t_w is mean time with livetime correction. t_s is start time. t_e is end time. R^2 is square of the distance between the Sun and the Earth, in unit of AU². ϕ_ν is measured ⁸B neutrino flux without correction of R^2

No.	t_w	t_s	t_e	R^2	ϕ_ν	No.	t_w	t_s	t_e	R^2	ϕ_ν
1	1996/06/02 03:46	05/31 04:31	06/05 08:49	1.029	2.74+0.63-0.53	61	1997/04/07 20:00	04/05 13:22	04/10 03:03	1.002	1.65+0.47-0.38
2	1996/06/07 14:58	06/05 14:13	06/10 01:19	1.030	2.83+0.75-0.62	62	1997/04/12 14:02	04/10 03:46	04/15 05:51	1.005	2.61+0.52-0.45
3	1996/06/12 12:40	06/10 01:27	06/15 04:36	1.031	2.30+0.53-0.45	63	1997/04/18 02:57	04/15 06:13	04/20 04:41	1.008	2.21+0.57-0.48
4	1996/06/17 16:37	06/15 09:14	06/20 03:41	1.032	1.79+0.55-0.44	64	1997/04/21 23:13	04/20 07:17	04/25 00:07	1.010	3.20+0.83-0.67
5	1996/06/22 03:07	06/20 03:45	06/25 04:55	1.033	3.15+0.74-0.61	65	1997/04/28 07:51	04/25 01:13	04/30 00:22	1.014	2.26+0.68-0.54
6	1996/06/27 23:30	06/25 05:02	06/30 14:11	1.033	1.72+0.50-0.40	66	1997/05/03 00:50	04/30 00:31	05/05 15:37	1.016	2.59+0.50-0.43
7	1996/07/02 20:29	06/30 14:16	07/05 05:29	1.034	2.96+0.61-0.51	67	1997/05/07 23:46	05/05 15:39	05/10 03:37	1.018	1.69+0.48-0.39
8	1996/07/07 18:45	07/05 05:36	07/10 03:18	1.034	2.10+0.53-0.44	68	1997/05/12 19:48	05/10 04:19	05/15 09:10	1.021	2.86+0.51-0.44
9	1996/07/12 11:30	07/10 03:30	07/15 00:22	1.033	1.31+0.70-0.57	69	1997/05/17 20:55	05/15 09:12	05/20 00:38	1.023	2.05+0.50-0.41
10	1996/07/17 22:07	07/15 00:25	07/20 01:19	1.033	2.94+0.58-0.50	70	1997/05/22 19:55	05/20 00:41	05/25 09:09	1.025	2.14+0.55-0.45
11	1996/07/22 11:35	07/20 01:28	07/25 00:34	1.032	2.48+0.54-0.45	71	1997/05/27 20:45	05/25 09:12	05/31 05:47	1.027	2.25+0.53-0.43
12	1996/07/28 04:01	07/25 00:59	07/31 08:19	1.031	2.05+0.43-0.37	72	1997/06/03 13:01	05/31 06:10	06/05 04:30	1.029	1.82+0.92-0.63
13	1996/08/03 02:39	07/31 16:06	08/05 03:46	1.030	1.62+0.58-0.45	73	1997/06/07 15:22	06/05 05:52	06/10 02:33	1.030	2.69+0.53-0.46
14	1996/08/07 07:33	08/05 03:50	08/10 00:35	1.028	2.45+0.55-0.46	74	1997/06/12 13:28	06/10 03:33	06/15 05:11	1.031	1.69+0.47-0.39
15	1996/08/13 21:16	08/10 20:31	08/15 03:23	1.026	1.96+0.73-0.57	75	1997/06/17 17:29	06/15 05:37	06/20 12:17	1.032	2.72+0.51-0.44
16	1996/08/17 20:59	08/15 03:58	08/20 06:16	1.025	2.55+0.57-0.48	76	1997/06/22 18:27	06/20 12:22	06/25 07:47	1.033	2.54+0.50-0.44
17	1996/08/22 14:58	08/20 06:33	08/25 08:37	1.023	2.89+0.57-0.49	77	1997/06/28 08:00	06/25 07:51	06/30 02:28	1.033	2.89+0.61-0.52
18	1996/08/27 03:25	08/25 08:56	08/31 11:47	1.021	2.63+0.61-0.50	78	1997/07/02 17:57	06/30 02:31	07/05 01:17	1.034	1.84+0.48-0.41
19	1996/09/08 00:02	09/05 02:47	09/10 11:28	1.015	2.01+0.46-0.39	79	1997/07/07 19:24	07/05 01:53	07/10 07:24	1.034	2.07+0.46-0.40
20	1996/09/12 19:05	09/10 11:53	09/15 02:08	1.013	1.69+0.53-0.43	80	1997/07/12 21:04	07/10 07:29	07/15 10:22	1.033	1.34+0.41-0.35
21	1996/09/17 15:43	09/15 03:37	09/20 00:38	1.010	1.70+0.49-0.40	81	1997/07/17 22:57	07/15 10:25	07/20 12:47	1.033	3.11+0.51-0.45
22	1996/09/22 18:24	09/20 05:00	09/25 03:55	1.007	2.28+0.49-0.42	82	1997/07/22 11:16	07/20 12:55	07/25 04:51	1.032	1.94+0.57-0.48
23	1996/09/28 00:31	09/25 04:27	09/30 11:13	1.004	2.68+0.52-0.45	83	1997/07/28 13:06	07/25 05:18	07/31 00:40	1.031	2.83+0.51-0.44
24	1996/10/02 11:45	09/30 11:14	10/05 01:13	1.002	3.31+0.60-0.51	84	1997/08/02 13:56	07/31 01:04	08/05 00:35	1.030	2.28+0.45-0.38
25	1996/10/07 18:36	10/05 01:46	10/10 10:31	0.999	1.75+0.48-0.39	85	1997/08/07 15:44	08/05 00:39	08/10 05:33	1.028	2.34+0.46-0.40
26	1996/10/12 20:47	10/10 10:42	10/15 08:16	0.996	1.00+0.41-0.33	86	1997/08/12 16:50	08/10 05:38	08/15 06:15	1.027	2.43+0.56-0.48
27	1996/10/18 01:24	10/15 09:48	10/20 16:22	0.993	2.39+0.50-0.42	87	1997/08/17 21:18	08/15 06:19	08/20 14:35	1.025	1.79+0.42-0.36
28	1996/10/23 02:45	10/20 17:31	10/25 12:04	0.990	2.55+0.52-0.44	88	1997/08/23 06:06	08/20 14:45	08/25 20:02	1.023	2.25+0.46-0.41
29	1996/10/27 18:29	10/25 13:08	10/30 03:19	0.987	2.28+0.54-0.45	89	1997/08/28 17:26	08/25 20:03	08/31 13:09	1.020	2.68+0.44-0.39
30	1996/11/02 02:38	10/30 03:47	11/05 00:53	0.985	2.73+0.46-0.39	90	1997/09/02 23:59	08/31 13:11	09/05 15:30	1.018	1.34+0.47-0.40
31	1996/11/08 00:22	11/05 01:30	11/10 22:14	0.982	2.62+0.45-0.39	91	1997/09/07 05:35	09/05 15:32	09/10 04:48	1.016	2.11+0.60-0.49
32	1996/11/12 18:47	11/10 22:17	11/15 06:11	0.979	1.98+0.55-0.44	92	1997/09/14 05:31	09/10 04:50	09/15 21:50	1.012	2.12+0.61-0.51
33	1996/11/17 21:41	11/15 06:45	11/20 11:37	0.977	2.55+0.52-0.44	93	1997/10/04 14:39	09/30 00:42	10/05 10:51	1.001	2.71+0.89-0.70
34	1996/11/23 04:20	11/20 12:34	11/25 16:01	0.975	1.69+0.46-0.37	94	1997/10/06 22:10	10/05 11:11	10/10 18:48	0.999	2.25+0.71-0.55
35	1996/11/27 19:50	11/25 16:05	11/30 01:02	0.973	1.35+0.45-0.36	95	1997/10/13 10:04	10/10 18:50	10/15 17:15	0.995	2.01+0.53-0.44
36	1996/12/02 20:53	11/30 01:07	12/05 18:46	0.972	2.02+0.47-0.39	96	1997/10/18 13:13	10/15 18:52	10/20 16:16	0.993	2.06+0.70-0.56
37	1996/12/08 04:11	12/05 18:50	12/10 07:00	0.970	1.87+0.49-0.40	97	1997/10/22 14:08	10/20 18:13	10/25 17:55	0.990	4.26+0.98-0.81
38	1996/12/13 07:39	12/10 07:04	12/15 22:32	0.969	2.35+0.58-0.48	98	1997/10/28 04:09	10/25 17:57	10/30 14:40	0.987	2.54+0.46-0.40
39	1996/12/18 04:07	12/15 22:37	12/20 16:53	0.968	2.43+0.58-0.49	99	1997/11/02 13:49	10/30 14:49	11/05 14:02	0.984	1.74+0.39-0.33
40	1996/12/23 02:52	12/20 17:14	12/25 09:10	0.968	2.52+0.51-0.43	100	1997/11/08 06:12	11/05 14:04	11/10 18:55	0.982	1.50+0.38-0.32
41	1996/12/28 09:23	12/25 09:15	12/31 04:42	0.967	2.09+0.44-0.36	101	1997/11/13 08:32	11/11 00:53	11/15 09:59	0.979	2.66+0.50-0.43
42	1997/01/03 03:46	12/31 04:46	01/05 14:25	0.967	2.27+0.47-0.40	102	1997/11/18 03:46	11/15 13:26	11/20 19:59	0.977	2.91+0.54-0.46
43	1997/01/08 04:17	01/05 14:31	01/10 14:11	0.967	3.12+0.54-0.47	103	1997/11/22 13:56	11/20 20:02	11/25 00:20	0.975	3.06+0.60-0.52
44	1997/01/12 02:32	01/10 14:15	01/15 01:14	0.967	2.12+0.58-0.47	104	1997/11/27 05:32	11/25 00:50	11/30 02:45	0.974	2.23+0.51-0.43
45	1997/01/17 20:51	01/15 02:10	01/20 09:04	0.968	1.95+0.54-0.45	105	1997/12/02 10:36	11/30 04:04	12/05 10:18	0.972	3.02+0.60-0.52
46	1997/01/23 05:35	01/20 16:50	01/25 13:44	0.969	2.53+0.53-0.45	106	1997/12/07 23:43	12/05 10:35	12/10 11:35	0.970	2.30+0.47-0.41
47	1997/01/28 13:08	01/25 13:52	01/31 08:09	0.970	2.33+0.46-0.40	107	1997/12/12 20:02	12/10 11:38	12/15 05:25	0.969	2.31+0.44-0.38
48	1997/02/02 21:04	01/31 08:58	02/05 09:26	0.971	2.85+0.50-0.43	108	1997/12/17 22:06	12/15 05:27	12/20 13:00	0.968	2.30+0.47-0.40
49	1997/02/08 01:15	02/05 10:09	02/10 16:01	0.973	2.40+0.47-0.40	109	1997/12/23 02:06	12/20 13:14	12/25 16:12	0.968	2.65+0.46-0.40
50	1997/02/12 23:31	02/10 16:04	02/15 03:25	0.975	2.45+0.55-0.46	110	1997/12/28 21:09	12/25 16:15	12/31 21:10	0.967	2.46+0.41-0.36
51	1997/02/18 04:20	02/15 04:58	02/20 06:56	0.977	2.15+0.55-0.46	111	1998/01/02 13:57	12/31 21:12	01/05 10:10	0.968	2.13+0.55-0.46
52	1997/02/22 16:11	02/20 08:22	02/25 03:02	0.979	2.27+0.53-0.45	112	1998/01/08 05:37	01/05 12:39	01/10 23:32	0.967	2.72+0.51-0.44
53	1997/02/27 00:36	02/25 03:53	02/28 22:36	0.981	1.78+0.49-0.40	113	1998/01/13 14:01	01/10 23:34	01/16 00:27	0.967	2.16+0.55-0.48
54	1997/03/03 02:52	02/28 22:39	03/05 08:23	0.983	2.19+0.50-0.42	114	1998/01/18 08:12	01/16 01:00	01/20 08:45	0.968	2.60+0.54-0.46
55	1997/03/08 05:42	03/05 17:59	03/10 09:39	0.985	2.70+0.61-0.50	115	1998/01/23 02:57	01/20 09:11	01/25 18:05	0.969	2.37+0.44-0.39
56	1997/03/13 04:23	03/10 09:46	03/15 22:46	0.988	2.37+0.45-0.38	116	1998/01/28 14:49	01/25 18:20	01/31 11:16	0.970	2.20+0.40-0.35
57	1997/03/18 00:12	03/15 22:49	03/20 02:16	0.990	2.51+0.56-0.47	117	1998/02/02 20:45	01/31 11:18	02/05 02:46	0.971	1.60+0.43-0.36
58	1997/03/22 12:30	03/20 02:26	03/25 08:29	0.993	2.03+0.49-0.41	118	1998/02/07 17:38	02/05 03:14	02/10 06:59	0.973	1.63+0.41-0.34
59	1997/03/28 10:23	03/25 08:33	03/31 09:21	0.996	2.03+0.43-0.36	119	1998/02/12 23:28	02/10 07:02	02/15 08:26	0.975	2.57+0.47-0.41
60	1997/04/03 04:23	03/31 21:11	04/05 13:02	1.000	2.63+0.52-0.45	120	1998/02/17 17:14	02/15 08:28	02/20 08:10	0.976	2.22+0.45-0.39

No.	t_w	t_s	t_e	R^2	ϕ_ν	No.	t_w	t_s	t_e	R^2	ϕ_ν
121	1998/02/23 08:39	02/20 09:45	02/25 17:10	0.979	2.66+0.48-0.42	181	1998/12/22 16:05	12/20 05:31	12/25 02:27	0.968	3.36+0.60-0.52
122	1998/02/27 05:25	02/25 17:12	02/28 17:32	0.981	1.80+0.53-0.43	182	1998/12/28 12:01	12/25 03:33	12/31 13:01	0.967	2.31+0.42-0.37
123	1998/03/02 22:08	02/28 17:35	03/05 10:44	0.982	1.75+0.46-0.39	183	1999/01/03 01:15	12/31 13:58	01/05 10:50	0.967	2.48+0.49-0.42
124	1998/03/08 00:22	03/05 12:10	03/10 06:37	0.985	2.39+0.48-0.42	184	1999/01/08 11:13	01/06 01:11	01/10 20:01	0.967	3.16+0.63-0.54
125	1998/03/12 13:34	03/10 06:41	03/15 06:08	0.987	2.14+0.45-0.39	185	1999/01/13 04:24	01/10 20:03	01/15 15:41	0.967	3.21+0.63-0.54
126	1998/03/18 12:54	03/15 07:09	03/20 00:39	0.991	2.85+0.62-0.52	186	1999/01/17 19:04	01/15 15:43	01/20 00:03	0.968	2.37+0.48-0.41
127	1998/03/22 23:02	03/20 00:42	03/25 21:56	0.993	2.32+0.40-0.35	187	1999/01/23 01:03	01/20 00:45	01/25 12:23	0.969	2.56+0.48-0.42
128	1998/03/28 19:09	03/25 21:58	03/31 15:49	0.996	2.24+0.39-0.35	188	1999/01/28 14:39	01/25 12:25	01/31 18:46	0.970	2.81+0.42-0.38
129	1998/04/03 02:58	03/31 15:51	04/05 13:32	0.999	2.20+0.43-0.38	189	1999/02/03 00:05	01/31 18:47	02/05 04:43	0.971	3.60+0.51-0.45
130	1998/04/08 06:34	04/05 13:35	04/10 22:50	1.002	1.61+0.38-0.32	190	1999/02/07 18:40	02/05 04:44	02/10 09:15	0.973	2.27+0.49-0.42
131	1998/04/13 05:22	04/10 22:52	04/15 23:13	1.005	2.84+0.52-0.45	191	1999/02/12 19:55	02/10 16:30	02/15 00:38	0.974	2.33+0.47-0.41
132	1998/04/18 02:26	04/15 23:15	04/20 10:41	1.008	1.68+0.44-0.37	192	1999/02/17 15:08	02/15 00:40	02/20 00:00	0.976	3.09+0.53-0.46
133	1998/04/23 00:08	04/20 11:35	04/25 11:29	1.011	3.51+0.51-0.45	193	1999/02/22 23:03	02/20 00:03	02/25 19:22	0.979	2.26+0.44-0.39
134	1998/04/27 22:58	04/25 11:32	04/30 10:27	1.013	2.82+0.46-0.40	194	1999/02/26 23:42	02/25 20:57	02/28 02:13	0.980	2.80+0.72-0.58
135	1998/05/03 00:32	04/30 10:48	05/05 14:04	1.016	2.64+0.44-0.39	195	1999/03/02 15:37	02/28 02:16	03/05 04:59	0.982	2.98+0.47-0.41
136	1998/05/07 22:19	05/05 14:06	05/10 06:12	1.018	2.22+0.46-0.39	196	1999/03/07 10:04	03/05 05:02	03/10 00:33	0.985	2.40+0.49-0.42
137	1998/05/12 18:28	05/10 06:14	05/15 10:05	1.021	1.93+0.46-0.39	197	1999/03/12 12:00	03/10 01:03	03/15 00:41	0.987	2.64+0.45-0.39
138	1998/05/18 04:13	05/15 20:20	05/20 12:03	1.023	1.85+0.44-0.37	198	1999/03/17 17:26	03/15 01:21	03/20 08:31	0.990	1.79+0.40-0.34
139	1998/05/23 00:59	05/20 12:06	05/25 10:06	1.025	2.17+0.45-0.39	199	1999/03/23 08:01	03/20 08:34	03/25 23:04	0.993	1.97+0.44-0.38
140	1998/05/28 13:15	05/25 10:08	05/31 16:14	1.027	2.58+0.42-0.37	200	1999/03/28 20:48	03/25 23:05	03/31 16:11	0.996	2.40+0.48-0.41
141	1998/06/02 20:08	05/31 16:15	06/05 00:44	1.029	2.58+0.50-0.44	201	1999/04/03 07:55	04/01 01:42	04/05 08:23	0.999	1.73+0.51-0.42
142	1998/06/07 15:53	06/05 00:46	06/10 07:54	1.030	2.65+0.45-0.40	202	1999/04/08 01:01	04/05 08:31	04/10 00:02	1.002	2.70+0.55-0.47
143	1998/06/12 16:53	06/10 07:57	06/15 00:50	1.031	2.09+0.44-0.37	203	1999/04/12 05:55	04/10 00:22	04/15 13:14	1.004	2.74+0.50-0.44
144	1998/06/17 17:56	06/15 00:52	06/20 11:44	1.032	2.76+0.45-0.39	204	1999/04/29 15:02	04/25 03:57	04/30 19:59	1.014	1.90+0.66-0.54
145	1998/06/22 21:10	06/20 11:48	06/25 09:24	1.033	2.19+0.45-0.39	205	1999/05/03 02:23	04/30 20:00	05/05 10:16	1.016	2.66+0.49-0.42
146	1998/06/28 03:33	06/25 20:56	06/30 00:00	1.033	2.37+0.51-0.43	206	1999/05/07 19:17	05/05 10:19	05/10 04:14	1.018	2.36+0.46-0.39
147	1998/07/03 03:47	06/30 00:02	07/05 22:38	1.034	1.58+0.39-0.33	207	1999/05/13 13:56	05/10 04:15	05/15 23:11	1.021	3.09+0.53-0.46
148	1998/07/08 02:01	07/05 22:40	07/10 23:08	1.034	3.01+0.55-0.47	208	1999/05/18 15:42	05/15 23:13	05/20 16:02	1.023	2.20+0.55-0.46
149	1998/07/12 20:57	07/10 23:13	07/15 00:04	1.033	1.65+0.48-0.41	209	1999/05/23 02:24	05/20 16:06	05/25 12:54	1.025	1.62+0.39-0.33
150	1998/07/17 23:19	07/15 00:08	07/20 13:25	1.033	2.23+0.42-0.37	210	1999/05/28 08:23	05/25 12:55	05/31 04:51	1.027	2.46+0.46-0.40
151	1998/07/22 19:15	07/20 13:26	07/25 00:18	1.032	2.62+0.47-0.41	211	1999/06/02 13:42	05/31 04:53	06/05 00:30	1.028	2.42+0.45-0.39
152	1998/07/28 08:41	07/25 00:19	07/31 19:08	1.031	1.88+0.34-0.30	212	1999/06/07 22:21	06/05 00:36	06/10 18:57	1.030	2.40+0.41-0.36
153	1998/08/03 00:04	07/31 19:13	08/05 04:38	1.030	1.50+0.40-0.33	213	1999/06/12 23:05	06/10 18:59	06/15 04:15	1.031	1.34+0.41-0.34
154	1998/08/08 00:02	08/05 04:40	08/10 13:48	1.028	2.39+0.42-0.37	214	1999/06/17 11:06	06/15 04:17	06/20 02:39	1.032	2.19+0.50-0.42
155	1998/08/13 05:13	08/10 13:51	08/15 18:27	1.027	1.80+0.42-0.36	215	1999/06/23 06:29	06/20 02:43	06/25 15:30	1.033	2.24+0.43-0.37
156	1998/08/18 05:19	08/15 18:28	08/20 13:30	1.025	3.06+0.48-0.43	216	1999/06/27 23:37	06/25 15:31	06/30 05:21	1.033	2.63+0.47-0.41
157	1998/08/23 07:08	08/20 13:32	08/25 21:10	1.023	2.02+0.40-0.34	217	1999/07/03 02:31	06/30 05:39	07/05 16:48	1.034	2.39+0.43-0.38
158	1998/08/28 05:42	08/25 21:36	08/31 08:08	1.021	3.65+0.53-0.47	218	1999/07/08 07:33	07/05 17:32	07/10 08:12	1.034	2.11+0.47-0.40
159	1998/09/02 23:09	08/31 08:29	09/05 11:36	1.018	2.71+0.45-0.39	219	1999/07/11 21:19	07/10 08:18	07/15 07:11	1.034	1.32+0.62-0.51
160	1998/09/08 05:11	09/05 11:38	09/10 15:07	1.015	2.83+0.47-0.41	220	1999/07/18 11:06	07/15 13:26	07/20 00:09	1.033	2.19+0.76-0.60
161	1998/09/13 05:34	09/10 15:17	09/15 13:30	1.013	1.92+0.41-0.35	221	1999/07/24 00:13	07/20 00:11	07/25 21:16	1.032	1.90+0.51-0.42
162	1998/09/18 01:01	09/15 13:31	09/20 15:19	1.010	3.16+0.47-0.42	222	1999/07/28 18:54	07/25 21:20	07/31 02:30	1.031	1.87+0.48-0.40
163	1998/09/22 17:44	09/20 15:20	09/25 00:05	1.007	2.13+0.45-0.39	223	1999/08/02 21:36	07/31 02:39	08/05 09:56	1.030	2.40+0.48-0.41
164	1998/09/27 14:46	09/25 00:27	09/30 05:05	1.005	1.96+0.40-0.35	224	1999/08/08 01:16	08/05 12:09	08/10 15:46	1.028	1.54+0.42-0.36
165	1998/10/02 04:12	09/30 05:10	10/05 01:57	1.002	2.20+0.51-0.43	225	1999/08/12 23:29	08/10 15:48	08/15 05:54	1.027	3.24+0.51-0.45
166	1998/10/07 21:23	10/05 02:00	10/10 15:33	0.999	2.22+0.40-0.35	226	1999/08/17 23:12	08/15 05:55	08/20 17:18	1.025	2.59+0.45-0.40
167	1998/10/12 20:22	10/10 15:35	10/15 00:57	0.996	2.97+0.50-0.44	227	1999/08/23 03:41	08/20 17:19	08/25 14:11	1.023	1.86+0.43-0.38
168	1998/10/17 22:14	10/15 01:01	10/20 20:36	0.993	2.31+0.38-0.34	228	1999/08/28 19:28	08/25 14:18	08/31 11:54	1.020	2.78+0.47-0.41
169	1998/10/23 11:10	10/20 20:39	10/25 12:40	0.990	1.78+0.46-0.38	229	1999/09/03 02:15	08/31 11:57	09/05 15:00	1.018	2.13+0.43-0.37
170	1998/10/27 22:50	10/25 12:44	10/30 07:51	0.988	2.17+0.42-0.36	230	1999/09/08 01:13	09/05 15:01	09/10 13:27	1.015	1.74+0.42-0.35
171	1998/11/02 03:57	10/30 07:54	11/05 09:42	0.985	2.42+0.41-0.36	231	1999/09/12 21:50	09/10 13:28	09/15 02:10	1.013	2.62+0.49-0.43
172	1998/11/09 04:13	11/05 09:46	11/10 15:13	0.981	3.35+0.82-0.69	232	1999/09/18 01:38	09/15 02:18	09/20 21:40	1.010	2.64+0.44-0.39
173	1998/11/13 10:37	11/10 18:00	11/16 03:41	0.979	2.84+0.67-0.56	233	1999/09/22 23:03	09/20 21:41	09/25 08:13	1.007	1.77+0.47-0.40
174	1998/11/18 16:24	11/16 03:44	11/20 13:50	0.977	3.04+0.58-0.51	234	1999/09/28 02:39	09/25 08:36	09/30 20:40	1.005	2.54+0.40-0.35
175	1998/11/21 14:21	11/20 13:52	11/25 13:31	0.976	2.73+1.19-0.90	235	1999/10/03 02:49	09/30 20:42	10/05 09:22	1.002	2.97+0.50-0.44
176	1998/11/29 11:49	11/25 14:10	11/30 08:38	0.973	2.37+0.77-0.61	236	1999/10/07 21:29	10/05 17:25	10/10 12:04	0.999	1.47+0.42-0.35
177	1998/12/04 03:26	11/30 09:28	12/05 22:18	0.972	2.94+0.62-0.53	237	1999/10/12 19:14	10/10 12:09	10/15 08:34	0.996	2.38+0.47-0.41
178	1998/12/08 05:22	12/05 22:22	12/10 12:26	0.970	2.96+0.49-0.43	238	1999/10/18 06:27	10/15 14:33	10/21 00:12	0.993	2.16+0.44-0.38
179	1998/12/12 03:41	12/10 12:31	12/15 01:02	0.969	2.39+0.56-0.46	239	1999/10/22 05:51	10/21 00:14	10/25 21:14	0.991	2.10+0.72-0.60
180	1998/12/18 13:02	12/15 01:04	12/20 05:27	0.968	2.41+0.69-0.57	240	1999/10/28 12:18	10/25 23:33	10/30 10:26	0.987	1.61+0.60-0.50

No.	t_w	t_s	t_e	R^2	ϕ_ν	No.	t_w	t_s	t_e	R^2	ϕ_ν
241	1999/11/02 09:00	10/30 10:28	11/05 08:27	0.985	2.68+0.41-0.36	301	2000/09/13 22:38	09/11 15:22	09/16 11:07	1.012	1.88+0.45-0.38
242	1999/11/07 23:39	11/05 08:29	11/10 14:56	0.982	2.30+0.43-0.38	302	2000/09/18 09:06	09/16 11:55	09/20 04:05	1.010	2.90+0.57-0.50
243	1999/11/13 04:01	11/10 14:57	11/15 11:58	0.980	1.91+0.46-0.40	303	2000/09/22 20:15	09/20 04:09	09/25 08:41	1.007	2.42+0.46-0.40
244	1999/11/17 22:41	11/15 12:05	11/20 09:14	0.978	2.05+0.44-0.38	304	2000/09/29 07:27	09/25 11:06	10/03 03:01	1.003	2.61+0.36-0.33
245	1999/11/22 21:23	11/20 09:15	11/25 08:58	0.976	2.06+0.42-0.36	305	2000/10/04 15:19	10/03 03:02	10/06 14:25	1.000	2.22+0.57-0.46
246	1999/11/27 18:11	11/25 09:00	11/30 12:44	0.974	2.75+0.47-0.42	306	2000/10/11 00:37	10/06 14:28	10/15 02:45	0.997	2.04+0.33-0.30
247	1999/12/04 10:20	11/30 18:24	12/05 23:02	0.972	2.57+0.58-0.50	307	2000/10/16 19:14	10/15 02:49	10/18 14:45	0.993	2.08+0.52-0.43
248	1999/12/08 03:41	12/05 23:03	12/10 03:53	0.971	2.07+0.48-0.42	308	2000/10/19 09:43	10/18 18:15	10/20 01:19	0.992	4.23+1.05-0.89
249	1999/12/12 22:41	12/10 08:07	12/15 14:25	0.969	1.97+0.41-0.35	309	2000/10/23 08:29	10/20 01:22	10/26 09:55	0.990	2.04+0.40-0.35
250	1999/12/17 20:22	12/15 14:26	12/20 09:21	0.968	2.25+0.49-0.42	310	2000/10/28 13:37	10/26 09:58	10/31 07:33	0.987	2.58+0.52-0.45
251	1999/12/24 00:01	12/20 10:20	12/25 10:01	0.968	2.34+0.54-0.47	311	2000/11/03 08:47	10/31 07:34	11/06 09:32	0.984	2.43+0.43-0.37
252	1999/12/28 13:08	12/25 10:03	12/31 20:06	0.967	2.23+0.38-0.34	312	2000/11/08 20:17	11/06 09:39	11/11 06:38	0.981	2.27+0.46-0.39
253	2000/01/02 22:26	12/31 20:07	01/05 01:29	0.967	2.69+0.50-0.44	313	2000/11/14 05:34	11/11 07:11	11/16 21:41	0.979	2.25+0.44-0.38
254	2000/01/07 13:14	01/05 01:30	01/10 01:56	0.967	3.01+0.46-0.41	314	2000/11/18 15:38	11/16 21:43	11/21 15:44	0.977	2.58+0.58-0.49
255	2000/01/12 23:31	01/10 01:58	01/15 18:05	0.967	2.33+0.40-0.36	315	2000/11/24 15:49	11/21 17:26	11/27 11:32	0.975	2.54+0.42-0.37
256	2000/01/18 05:01	01/15 18:06	01/20 14:16	0.968	2.39+0.45-0.39	316	2000/11/28 20:31	11/27 11:36	11/30 08:10	0.973	2.47+0.68-0.56
257	2000/01/23 01:12	01/20 14:33	01/25 11:20	0.969	2.36+0.45-0.40	317	2000/12/03 07:02	11/30 08:26	12/06 10:49	0.972	3.01+0.55-0.47
258	2000/01/27 18:39	01/25 11:21	01/31 01:28	0.970	1.76+0.43-0.37	318	2000/12/08 06:40	12/06 10:50	12/10 02:44	0.970	1.17+0.42-0.34
259	2000/02/02 21:41	01/31 01:39	02/05 15:25	0.971	2.57+0.41-0.36	319	2000/12/15 11:16	12/10 02:46	12/19 16:55	0.969	2.46+0.35-0.32
260	2000/02/08 00:04	02/05 15:27	02/10 08:41	0.973	2.89+0.48-0.42	320	2000/12/20 07:49	12/19 17:08	12/20 23:17	0.968	1.87+1.21-0.87
261	2000/02/12 21:13	02/10 08:42	02/15 09:29	0.974	2.32+0.45-0.39	321	2000/12/24 06:28	12/20 23:32	12/27 18:25	0.967	2.89+0.43-0.38
262	2000/02/17 21:46	02/15 09:30	02/20 10:48	0.976	3.09+0.46-0.40	322	2001/01/01 09:17	12/27 18:30	01/05 09:49	0.967	2.56+0.35-0.31
263	2000/02/23 00:12	02/20 10:49	02/25 14:13	0.978	2.38+0.43-0.37	323	2001/01/06 04:44	01/05 09:52	01/06 22:30	0.967	1.70+0.83-0.61
264	2000/02/26 19:49	02/25 14:21	02/28 01:22	0.980	2.88+0.69-0.58	324	2001/01/09 11:08	01/06 22:32	01/11 16:44	0.967	2.71+0.59-0.51
265	2000/03/02 07:38	02/28 01:23	03/05 10:11	0.982	1.97+0.37-0.32	325	2001/01/13 22:26	01/11 16:46	01/16 14:26	0.967	1.25+0.40-0.34
266	2000/03/07 22:46	03/05 10:14	03/10 08:51	0.985	2.65+0.46-0.41	326	2001/01/19 03:49	01/16 14:32	01/22 03:19	0.968	3.55+0.49-0.43
267	2000/03/12 17:34	03/10 08:55	03/15 01:59	0.988	3.20+0.50-0.44	327	2001/01/24 22:11	01/22 03:21	01/27 12:17	0.969	2.65+0.44-0.39
268	2000/03/17 14:02	03/15 02:01	03/20 02:14	0.990	2.29+0.46-0.40	328	2001/01/29 08:26	01/27 12:20	01/31 03:25	0.970	2.75+0.54-0.46
269	2000/03/22 20:26	03/20 02:23	03/25 13:16	0.993	2.34+0.44-0.38	329	2001/02/02 23:50	01/31 03:28	02/05 21:23	0.971	2.74+0.44-0.40
270	2000/03/28 15:40	03/25 18:03	03/31 09:33	0.997	2.05+0.42-0.37	330	2001/02/08 15:36	02/05 21:26	02/11 06:17	0.973	2.21+0.40-0.35
271	2000/04/03 08:43	03/31 20:08	04/05 15:27	1.000	1.75+0.45-0.38	331	2001/02/14 07:28	02/11 06:19	02/16 23:11	0.975	2.74+0.50-0.44
272	2000/04/08 02:55	04/05 15:28	04/10 14:37	1.003	1.99+0.45-0.39	332	2001/02/18 09:49	02/16 23:14	02/20 01:26	0.977	3.45+0.66-0.56
273	2000/04/13 13:29	04/10 15:24	04/15 09:12	1.006	1.32+0.55-0.42	333	2001/02/23 16:10	02/20 01:35	02/26 09:02	0.979	1.62+0.42-0.36
274	2000/04/17 22:38	04/15 09:15	04/20 08:57	1.008	2.10+0.48-0.40	334	2001/03/01 01:19	02/26 15:02	03/02 08:36	0.982	2.07+0.60-0.48
275	2000/04/23 02:15	04/20 14:20	04/25 00:13	1.011	1.97+0.54-0.45	335	2001/03/04 09:05	03/02 08:38	03/06 08:26	0.983	2.29+0.48-0.41
276	2000/04/27 21:17	04/25 00:26	04/30 17:04	1.013	1.90+0.41-0.36	336	2001/03/08 08:08	03/06 08:28	03/10 04:39	0.985	3.39+0.58-0.50
277	2000/05/03 03:06	04/30 17:20	05/05 08:52	1.016	2.14+0.46-0.39	337	2001/03/15 08:39	03/10 04:44	03/23 09:21	0.989	2.44+0.29-0.27
278	2000/05/08 03:40	05/05 19:13	05/10 08:26	1.019	2.07+0.45-0.38	338	2001/03/26 13:04	03/23 09:24	03/29 16:56	0.995	2.75+0.41-0.37
279	2000/05/13 04:59	05/10 08:28	05/15 16:00	1.021	2.15+0.43-0.37	339	2001/03/31 21:34	03/29 18:53	04/03 00:02	0.998	2.18+0.47-0.41
280	2000/05/18 04:18	05/15 16:00	05/20 16:32	1.023	2.07+0.41-0.35	340	2001/04/06 04:43	04/03 00:05	04/09 10:16	1.001	1.67+0.36-0.31
281	2000/05/23 02:46	05/20 16:33	05/25 14:33	1.025	2.66+0.49-0.43	341	2001/04/12 20:47	04/10 14:50	04/15 07:42	1.005	3.20+0.52-0.46
282	2000/05/29 15:42	05/25 14:38	06/02 15:13	1.027	1.74+0.33-0.29	342	2001/04/18 02:57	04/15 07:46	04/20 22:30	1.008	2.08+0.41-0.36
283	2000/06/08 00:31	06/02 15:14	06/11 13:08	1.030	2.17+0.57-0.47	343	2001/04/24 11:57	04/20 22:33	04/28 08:53	1.012	2.70+0.40-0.36
284	2000/06/13 20:21	06/11 16:08	06/16 04:32	1.032	2.72+0.53-0.45	344	2001/04/29 17:29	04/28 19:54	04/30 09:36	1.014	2.05+1.10-0.78
285	2000/06/18 07:12	06/16 04:33	06/20 08:52	1.032	1.72+0.44-0.38	345	2001/05/03 05:49	04/30 22:18	05/05 10:11	1.016	3.23+0.67-0.57
286	2000/06/23 14:53	06/20 08:56	06/27 15:35	1.033	2.38+0.41-0.36	346	2001/05/08 05:03	05/05 20:49	05/10 16:53	1.019	2.46+0.67-0.56
287	2000/06/29 01:52	06/27 15:36	06/30 17:36	1.034	3.01+0.71-0.59	347	2001/05/13 19:11	05/10 16:55	05/16 10:09	1.021	2.62+0.48-0.42
288	2000/07/03 11:57	07/01 17:50	07/05 08:14	1.034	2.19+0.55-0.47	348	2001/05/18 18:15	05/16 10:13	05/21 01:50	1.023	3.49+0.52-0.46
289	2000/07/09 12:57	07/05 08:14	07/13 14:47	1.034	1.89+0.34-0.30	349	2001/05/24 19:08	05/21 01:52	05/28 05:22	1.026	2.95+0.41-0.37
290	2000/07/15 14:19	07/13 14:49	07/17 13:47	1.033	2.46+0.52-0.44	350	2001/06/01 01:32	05/28 05:25	06/04 20:38	1.028	2.40+0.35-0.32
291	2000/07/21 12:41	07/17 14:50	07/25 08:09	1.032	2.17+0.36-0.32	351	2001/06/05 14:10	06/04 20:41	06/06 07:34	1.030	2.69+0.90-0.70
292	2000/07/28 11:45	07/25 14:23	07/31 01:08	1.031	2.88+0.46-0.41	352	2001/06/08 17:38	06/06 07:37	06/11 02:23	1.030	2.80+0.47-0.41
293	2000/08/03 12:26	07/31 01:10	08/06 22:33	1.030	2.13+0.39-0.34	353	2001/06/13 08:58	06/11 02:26	06/15 14:03	1.031	1.84+0.43-0.37
294	2000/08/08 19:27	08/06 22:34	08/10 10:40	1.028	1.13+0.48-0.38	354	2001/06/18 02:54	06/15 14:07	06/20 16:35	1.032	2.77+0.43-0.38
295	2000/08/14 21:56	08/10 10:47	08/19 18:16	1.026	2.13+0.34-0.30	355	2001/06/23 13:36	06/20 16:38	06/26 16:58	1.033	1.60+0.38-0.33
296	2000/08/21 01:03	08/19 18:18	08/22 08:03	1.023	2.44+0.67-0.56	356	2001/06/28 18:33	06/26 17:01	06/30 20:07	1.033	1.21+0.43-0.36
297	2000/08/23 20:25	08/22 08:11	08/25 12:40	1.022	1.82+0.66-0.55	357	2001/07/05 14:02	06/30 20:08	07/10 11:38	1.034	2.44+0.31-0.28
298	2000/08/29 20:22	08/25 12:47	09/03 03:28	1.020	2.33+0.34-0.31	358	2001/07/12 16:28	07/10 12:40	07/15 08:34	1.033	2.63+0.51-0.45
299	2000/09/05 01:40	09/03 03:30	09/06 23:38	1.017	2.77+0.55-0.48						
300	2000/09/09 08:29	09/06 23:39	09/11 09:38	1.014	2.13+0.48-0.41						